Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claims 1 - 102. (Cancelled)

103. (currently amended) [[A]] An artificial neural network comprising:

(a) a plurality of neurons,

(b) each of the plurality of neurons being a processor with memory and being in an array;

(c) the plurality of neurons comprising a plurality of elemental neurons and a plurality of structural neurons;

(d) all elemental and structural neurons being configured to be associated with others of the elemental and structural neurons via active connections;

(e) each elemental neuron being configured to:

(i) represent a unique input value ~~input~~ into the artificial neural network ~~system~~, the unique value being at least one selected from the group consisting of: a stimulus, an event, events, a sequence in a pattern, a sequence of events, an elemental stimulus, a defined elemental pattern, a defined elemental data element, a basic input stimulus, and an output stimulus of information being processed; and

(ii) express that unique value as an output when activated by a structural neuron;

(f) each structural neuron being configured to:

(i) receive input from a pair of neurons of the plurality of neurons and with which it is an associating neuron; and

(ii) express that input as an output to that pair of neurons to activate the pair of neurons for expression.

104. (previously presented) An artificial neural network as claimed in claim 103, wherein any one of the plurality of neurons is able to associate with a neuron in the plurality of neurons via the active connections to a further neuron in the plurality of neurons, the further neuron being one of the plurality of structural neurons.

105. (previously presented) An artificial neural network as claimed in claim 103, wherein each structural neuron represents the combined information of patterns by the pair of neurons with which it associates, the structural neuron receiving input from the pair of neurons.

106. (previously presented) An artificial neural network as claimed in claim 103, wherein the plurality of elemental neurons is in a root level of the neural network.

107. (currently amended) An artificial neural network as claimed in claim 103, wherein the pair of neurons comprises at least one selected from the group consisting of: an elemental neuron and an elemental neuron, an elemental neuron and a structural neuron, a structural neuron and an elemental neuron, and a structural neuron and a structural neuron.

108. (previously presented) An artificial neural network as claimed in claim 103, wherein each of the plurality of neurons is one or more selected from the group consisting of: initiating neuron, associated neuron, and associating neuron; an initiating neuron being associated with an associated neuron via connections to the associating neuron.

109. (previously presented) An artificial neural network as claimed in claim 108, wherein the initiating neuron, the associated neuron and the associating neuron are connected based on proximal characteristics, the proximal characteristics being at least one of: temporal, spatial, intensity, magnitude and relative position of the input being processed.

110. (previously presented) An artificial neural network as claimed in claim 108, wherein each initiating neuron is able to associate with a plurality of associated neurons to form a plurality of pairs of neurons.

111. (previously presented) An artificial neural network as claimed in claim 108, wherein each associated neuron is able to associate with a plurality of initiating neurons to form a plurality of pairs of neurons.

112. (previously presented) An artificial neural network as claimed in claim 108, wherein when an initiating neuron receives input and an associated neuron receives input, the inputs are transmitted to all associating neurons of the initiating neuron and the associated neuron, the associating neuron of both the initiating neuron and the associated neuron then being activated and being able to produce output.

113. (previously presented) An artificial neural network as claimed in claim 112, wherein the associated neuron is activated and able to produce output in a manner selected from the group consisting of: at the same time as the initiating neuron, and after the initiating neuron.

114. (previously presented) An artificial neural network as claimed in claim 112, wherein the activation or production of output of the initiating neuron and the associated neuron is also based on proximal characteristics.

115. (previously presented) An artificial neural network as claimed in claim 114, wherein the proximal activation of or production of output from the initiating neuron and the associated neuron causes at least one selected from the group consisting of: the creation of a new associating neuron if none exists together with new connections between the initiating neuron and the new associating neuron and between the associated neuron and the new associating neuron, the strengthening of existing connections between the initiating neuron and the associating neuron and between the associated neuron and the associating neuron, and strengthening of the associating neuron.

116. (previously presented) An artificial neural network as claimed in claim 115, wherein the strengthening is by maintaining a frequency count of how often the associating neuron receives input from the initiating neuron and the associated neuron.

117. (previously presented) An artificial neural network as claimed in claim 108, wherein the associating neuron represents the sum of what is represented by the initiating neuron and the associated neuron.

118. (previously presented) An artificial neural network as claimed in claim 108, wherein once the associating neuron represents a result, the result need not be created in another neuron.

119. (previously presented) An artificial neural network as claimed in claim 103, wherein the plurality of elemental neurons is configured to: receive all input to the artificial neural network, and provide all output from the artificial neural network.

120. (previously presented) An artificial neural network as claimed in claim 103, wherein all neurons represent at least one of: value, information and pattern; and

processing is at least one of: associating neurons, expressing the pair of neurons with which a structural neuron associates, and expressing the value information or pattern represented by elemental neurons.

121. (currently amended) An artificial neural network as claimed in claim 103, wherein a level of the neural network is a deeper level within the neural network structure if, during expression, more steps are required to express the elemental neurons that [[is]] it represents.

122. (previously presented) An artificial neural network as claimed in claim 119, wherein associating a pair of neurons is learning, and expressing a pair of neurons is expression.

123. (previously presented) An artificial neural network as claimed in claim 121, wherein the artificial neural network is bi-directional with a forward mode being learning, and a reverse mode being expression.

124. (previously presented) An artificial neural network as claimed in claim 103, wherein the artificial neural network stores associations and not input data and represents patterns within patterns of associations.

125. (previously presented) An artificial neural network as claimed in claim 103, wherein each elemental neuron is selected from the group consisting of: a sensor neuron and a motor neuron.

126. (previously presented) An artificial neural network as claimed in claim 103, wherein each structural neuron represents a plurality of elemental neurons.

127. (previously presented) An artificial neural network as claimed in claim 103, wherein each of the plurality of neurons is able to be expressed.

128. (previously presented) An artificial neural network as claimed in claim 103, wherein the number of elemental neurons and structural neurons required for the memory is determined by the nature of the input to be processed.

129. (previously presented) An artificial neural network as claimed in claim 103, wherein the memory is to store a frequency of received inputs.

130. (previously presented) An artificial neural network as claimed in claim 108, wherein each neuron is a node in the array, each node having a plurality of pointers.

131. (previously presented) An artificial neural network as claimed in claim 130, wherein the plurality of pointers comprises two pointers for providing expression and further pointers to represent associations.

132. (previously presented) An artificial neural network as claimed in claim 130, wherein each pointer in each node contains at least one selected from the group consisting of: an address of another neuron, an elemental value for an elemental neuron, and a frequency count.

133. (previously presented) An artificial neural network as claimed in claim 130, wherein the number of pointers depends on a function being performed by the artificial neural network, the number of pointers for each neuron being at least two.

134. (previously presented) An artificial neural network as claimed in claim 130, wherein a function of each pointer to a neuron is selected from the group consisting of: initiating, associating, successor, next successor of the initiating neuron, precessor, and next precessor of the associating neuron.

135. (previously presented) An artificial neural network as claimed in claim 130, wherein at least one pointer for an elemental neuron represents elemental values.

136. (previously presented) An artificial neural network as claimed in claim 130, wherein all neurons are a fixed length addressable node in the array.

137. (previously presented) An artificial neural network as claimed in claim 103, wherein the artificial neural network is used for at least one selected from the group consisting of: monitoring and predicting stock price movements, Internet surveillance, Internet security, computer virus detection, computer spam detection, phrases in speech and text, clauses in speech and text, plagiarism detection, bioinformatics, vision recognition, semantic analysis, representation of data ontologies, robotics, and data compression.

138. (previously presented) An artificial neural network comprising:

(a) a plurality of neurons,

(b) each of the plurality of neurons being a processor with memory and being in an array;

(c) the plurality of neurons comprising a plurality of elemental neurons and a plurality of structural neurons;

(d) all elemental and structural neurons being configured to be associated with others of the elemental and structural neurons via active connections;

(e) each elemental neuron being configured to:

(i) represent a unique value able to be input into the artificial neural network system, the unique value being one of: a stimulus, an event, events, a sequence in a pattern or sequence of events; and

(ii) express that unique value as an output; and

(f) each structural neuron being configured to receive input from a pair of neurons with which it is associating, the pair of neurons being selected from the group consisting of: both elemental neurons, both structural neurons, one structural and one elemental neuron, and one elemental neuron and one structural neuron.

139. (previously presented) An artificial neural network as claimed in claim 138, wherein the plurality of elemental neurons are in a root level of the neural network, and each elemental neuron represents a unique value, the unique value being at least one selected from the group consisting of: a stimulus, an event, events, a sequence in a pattern, a sequence of events, an elemental stimulus, a defined elemental pattern, a defined elemental data element, a basic input stimulus, and an output stimulus of information being processed.

140. (previously presented) An artificial neural network as claimed in claim 138, wherein each elemental neuron is selected from the group consisting of: a sensor neuron and a motor neuron.

141. (previously presented) An artificial neural network as claimed in claim 138, wherein all neurons represent at least one of: value, information and pattern; and processing is at least one of: associating neurons, expressing the pair of neurons with which a structural neuron associates, and expressing the value information or pattern represented by elemental neurons.

142. (previously presented) An artificial neural network as claimed in claim 138, wherein neuron associations are represented in a plurality of deeper neural levels; the number of levels in the plurality of deeper levels being determined by the extent of the pattern to be processed or expressed, where a structural neuron represents a plurality of elemental neurons.

143. (previously presented) An artificial neural network as claimed in claim 142, wherein the number of elemental neurons and structural neurons required for the memory is determined by the nature of the input to be processed.

144. (previously presented) An artificial neural network as claimed in claim 138, wherein any one of the plurality of neurons is able to associate with a neuron in the plurality of neurons via the active connections to a further neuron in the plurality of neurons, the further neuron being one of the plurality of structural neurons.

145. (previously presented) An artificial neural network as claimed in claim 138, wherein the artificial neural network is bi-directional with a forward mode being learning, and a reverse mode being expression.

146. (previously presented) An artificial neural network as claimed in claim 138, wherein the artificial neural network stores associations and not input data and represents patterns within patterns of associations.

147. (previously presented) An artificial neural network as claimed in claim 138, wherein each of the plurality of neurons is able to be expressed.

148. (previously presented) An artificial neural network comprising:

(a) a plurality of neurons,

(b) each of the plurality of neurons being a processor with memory and being in an array;

(c) the plurality of neurons comprising a plurality of elemental neurons and a plurality of structural neurons;

(d) all elemental and structural neurons being configured to be associated with others of the elemental and structural neurons via active connections;

(e) each elemental neuron being configured to:

(i) represent a unique value able to be input into the artificial neural network system, the unique value being at least one selected from the group consisting of: a stimulus, an event, events, a sequence in a pattern, a sequence of events, an elemental stimulus, a defined elemental pattern, a defined elemental data element, a basic input stimulus, and an output stimulus of information being processed; and

(ii) express that unique value as an output;

f) all of the plurality of structural neurons being able to be expressed in terms of the elemental neurons from which they were derived or represent.

149. (previously presented) An artificial neural network as claimed in claim 148, wherein the artificial neural network is bi-directional with a forward mode being learning, and a reverse mode being expression.

150. (previously presented) An artificial neural network as claimed in claim 148, wherein the artificial neural network stores associations and not input data and recognizes patterns within patterns of associations.

151. (previously presented) An artificial neural network as claimed in claim 148, wherein the neural network is bi-directional with all elemental neurons being able

to express their elemental values, and all structural neurons being able to express a pair of neurons with which they associate.

152. (previously presented) An artificial neural network comprising:

(a) a plurality of neurons,

(b) each of the plurality of neurons being a processor with memory and being a node in an array;

(c) the plurality of neurons comprising a plurality of elemental neurons and a plurality of structural neurons;

(d) all elemental and structural neurons being configured to be associated with others of the elemental and structural neurons via connections;

(e) the artificial neural network being bi-directional and being able to operate in a forward mode where structural neurons are created from input events from the elemental neurons, and in a reverse mode where input events are expressed by the elemental neurons.

153. (previously presented) An artificial neural network as claimed in claim 152, wherein the forward mode is learning, and the reverse direction is expression.

154. (previously presented) An artificial neural network as claimed in claim 152, wherein the neural network stores associations and not input data.

155. (currently amended) An artificial neural network as claimed in claim 152, wherein the neural network represents and recognizes patterns within ~~patters~~ patterns of associations.

156. (currently amended) A neuronal assembly ~~for use in~~ of an artificial neural network, the neuronal assembly comprising an initiating neuron, an associated neuron,

and an associating neuron operatively connected [[to]] with the initiating neuron and the associated neuron; the associating neuron representing the sum of what is represented by the initiating neuron and the associated neuron, and once the associating neuron represents a result, the result need not be created in another neuron.

157. (currently amended) ~~An artificial neural network~~ A neuronal assembly as claimed in claim 156, wherein the artificial neural network is as claimed in claim 103.

158. (previously presented) A neuronal assembly as claimed in claim 156, wherein when an initiating neuron receives input and an associated neuron receives input, the inputs are transmitted to all associating neurons of the initiating neuron and the associated neuron, the associating neuron of both the initiating neuron and the associated neuron then being activated and being able to produce output.

159. (previously presented) A neuronal assembly as claimed in claim 158, wherein the associated neuron is able to produce output in a manner selected from the group consisting of: at the same time as the initiating neuron, and after the initiating neuron.

160. (previously presented) A neuronal assembly as claimed in claim 158, wherein the activation of or producing of output from of the initiating neuron and the associated neuron is based on proximal characteristics.

161. (previously presented) A neuronal assembly as claimed in claim 160, wherein the proximal activation of or producing of output from the initiating neuron and the associated neuron causes at least one selected from the group consisting of: the creation of a new associating neuron if none exists together with new connections between the initiating neuron and the new associating neuron and between the

associated neuron and the new associating neuron, the strengthening of existing connections between the initiating neuron and the associating neuron and between the associated neuron and the associating neuron, and strengthening of the associating neuron.

162. (cancelled)

163. (cancelled)

164. (currently amended) A method for creating an association of neurons in an artificial neural network having a plurality of neurons, ~~once~~ one of the plurality of neurons being an initiating neuron, another of the plurality of neurons being an associated neuron operatively connected with the initiating neuron, and a further neuron of the plurality of neurons being an associating neuron operatively connected with the initiating neuron and the associated neuron; the method comprising:

activating or producing an output from the initiating neuron to potentiate the associating neuron; and

activating or producing an output from the associated neuron to potentiate and activate the associating neuron, the associating neuron then being activated and able to produce an output; the associating neuron representing the sum of what is represented by the initiating neuron and the associated neuron, and once the associating neuron represents a result, the result need not be created in another neuron.

165. (previously presented) A method as claimed in claim 164, wherein the associating neuron is expressed by the associating neuron expressing the initiating neuron and the associated neuron.

166. (previously presented) A method as claimed in claim 164, wherein the associated neuron is activated or produces an output in a manner selected from the group consisting of: at the same time as the initiating neuron, and after the initiating neuron.

167. (previously presented) A method as claimed in claim 164, wherein the activation of or producing an output by the initiating neuron and the activation of or producing an output by the associated neuron is based on proximal characteristics.

168. (previously presented) A method as claimed in claim 167, wherein the proximal activation of or producing output from the initiating neuron and the associated neuron causes at least one selected from the group consisting of: the creation of a new associating neuron if none exists together with new connections between the initiating neuron and the new associating neuron and between the associated neuron and the new associating neuron, the strengthening of existing connections between the initiating neuron and the associating neuron and between the associated neuron and the associating neuron, and strengthening of the associating neuron.

169. (previously presented) A method as claimed in claim 164, wherein the associating neuron represents the sum of what is learnt from the initiating neuron and the associated neuron.

170. (previously presented) A method as claimed in claim 168, wherein once the new associating neuron is created to represent a result, the result need not be created in another neuron.

171. (previously presented) A method as claimed in claim 164, wherein once the associating neuron represents a result, the result need not be created in another neuron.

172. (currently amended) A method of ~~operating~~ constructing an artificial neural network comprising a plurality of neurons, the plurality of neurons comprising a plurality of elemental neurons and a plurality of structural neurons, the method comprising:

defining unique events the elemental neurons will represent;

creating a required number of elemental neurons for the total number of unique values to be represented for all defined events; the unique value being at least one selected from the group consisting of: a stimulus, an event, events, a sequence in a pattern, a sequence of events, an elemental stimulus, a defined elemental pattern, a defined elemental data element, a basic input stimulus, and an output stimulus of information being processed;

the plurality of elemental neurons receiving all input to the artificial neural network, all output from the artificial neural network being from the plurality of elemental neurons;

creating ~~processes for creating~~ the plurality of structural neurons, each of the structural neurons being created by the association of a pair of the plurality of neurons;

each of the plurality of structural neurons being configured to ~~creating processes for producing~~ produce an output ~~from a structural neuron~~ on activation by the pair of neurons, the pair of neurons comprising an initiating neuron and an associated neuron;

the association of the plurality of neurons being based on proximal characteristics ~~creating processes for association of the plurality of neurons~~; and

each of the plurality of structural neurons being configured to express ~~its input to~~ the pair of neurons ~~creating processes for expression of each of the plurality of neurons~~.

173. (previously presented) A method as claimed in claim 172, wherein any one of the plurality of neurons is able to associate with a neuron in the plurality of neurons via active connections to a further neuron in the plurality of neurons, the further neuron being one of the plurality of structural neurons.

174. (previously presented) A method as claimed in claim 172 wherein all elemental neurons are able to express their elemental values, and all structural neurons are able to express ~~a~~ the pair of neurons with which they associate.

175. (previously presented) A method as claimed in claim 174, wherein the pair of neurons is selected from the group consisting of: an elemental neuron with an elemental neuron, an elemental neuron with a structural neuron, a structural neuron with an elemental neuron, a structural neuron with a structural neuron.

176. (previously presented) A method as claimed in claim 172, wherein each of the plurality of neurons is one or more selected from the group consisting of: initiating neuron, associating neuron, and associating neuron; an initiating neuron being associated with an associated neuron via connections to the associating neuron.

177. (previously presented) A method as claimed in claim 176, wherein the initiating neuron, the associated neuron and the associating neuron are connected based on proximal characteristics selected from the group consisting of: temporal, spatial, intensity, magnitude and relative position of the input being processed.

178. (previously presented) A method as claimed in claims 172, wherein a level of the neural network is a deeper level within the artificial neural network if, during recollection, more steps are required to express the elemental neurons.

179. (previously presented) A method as claimed in claim 176, wherein when an initiating neuron receives input and an associated neuron receives input, the inputs are transmitted to all associating neurons of the initiating neuron and the associated neuron respectively, the associating neuron of both the initiating neuron and the associated neuron then being activated and being able to produce output.

180. (previously presented) A method as claimed in claim 179, wherein the associated neuron is activated or an output produced in a manner selected from the group consisting of: at the same time as the initiating neuron, and after the initiating neuron.

181. (previously presented) A method as claimed in claim 179, wherein the activation of or producing an output from the initiating neuron and the activation of or producing an output from the associated neuron is based on proximal characteristics.

182. (previously presented) A method as claimed in claim 181, wherein the proximal activation of or producing an output from the initiating neuron and the associated neuron causes at least one selected from the group consisting of: the creation of a new associating neuron including new synaptic connections between the initiating neuron and the new associating neuron and between the associated neuron and the new associating neuron, the strengthening of existing synaptic connections between the initiating neuron and the associating neuron and between the associated neuron and the associating neuron, and the strengthening of the associating neuron.

183. (previously presented) A method as claimed in claim 182, wherein the strengthening is by maintaining a frequency count of how often the associating neuron receives input from the initiating neuron and the associated neuron.

184. (previously presented) A method as claimed in claim 176, wherein the associating neuron represents the sum of what is represented by the initiating neuron and the associated neuron.

185. (cancelled)

186. (previously presented) A method as claimed in claim 185, wherein a memory represents a plurality of elemental stimuli, and each elemental stimulus is represented directly by an elemental neuron.

187. (previously presented) A method as claimed in claim 172, wherein the number of elemental neurons required to represent the memory is determined by the nature of the input being processed.

188. (previously presented) A method as claimed in claim 172, wherein each neuron is represented by an addressable node in an array, each node having a plurality of pointers.

189. (previously presented) A method as claimed in claim 172, wherein the plurality of elemental neurons is in a root level of the neural network.

190. (previously presented) A method as claimed in claim 176, wherein each initiating neuron is able to associate with a plurality of associated neurons to form a plurality of pairs of neurons.

191. (previously presented) A method as claimed in claim 176, wherein each associated neuron is able to associate with a plurality of initiating neurons to form a plurality of pairs of neurons.

192. (previously presented) A method as claimed in claim 176, wherein once the associating neuron represents a result, the result need not be created in another neuron.

193. (previously presented) A method as claimed in claim 172, wherein the plurality of elemental neurons is configured to: receive all input to the artificial neural network, and provide all output from the artificial neural network.

194. (previously presented) A method as claimed in claim 172, wherein all neurons represent at least one of: value, information and pattern; and processing is at least one of: associating neurons, expressing the pair of neurons with which a structural neuron associates, and expressing the value information or pattern represented by elemental neurons.

195. (previously presented) A method as claimed in claim 172, wherein associating a pair of neurons is learning, and expressing a pair of neurons is expression.

196. (previously presented) A method as claimed in claim 195, wherein the artificial neural network is bi-directional with a forward mode being learning, and a reverse mode being expression.

197. (previously presented) A method as claimed in claim 172, wherein the artificial neural network stores associations and not input data and represents patterns within patterns of associations.

198. (previously presented) A method as claimed in claim 172, wherein each elemental neuron is selected from the group consisting of: a sensor neuron and a motor neuron.

199. (previously presented) A method as claimed in claim 172, wherein each structural neuron represents a plurality of elemental neurons.

200. (previously presented) A method as claimed in claim 172, wherein each of the plurality of neurons is able to be expressed.

201. (previously presented) A method as claimed in claim 188, wherein the plurality of pointers comprises two pointers for providing expression and further pointers to represent associations.

202. (previously presented) A method as claimed in claim 201, wherein each pointer in each node contains at least one selected from the group consisting of: an address of another neuron, an elemental value for an elemental neuron, and a frequency count.

203. (previously presented) A method as claimed in claim 201, wherein the number of pointers depends on a function being performed by the artificial neural network, the number of pointers for each neuron being at least two.

204. (previously presented) A method as claimed in claim 201, wherein a function of each pointer to a neuron is selected from the group consisting of: initiating, associating, successor, next successor of the initiating neuron, precessor, and next precessor of the associating neuron.

205. (previously presented) A method as claimed in claim 201, wherein at least one pointer for an elemental neuron represents elemental values.

206. (previously presented) A method as claimed in claim 201, wherein all neurons are a fixed length addressable node in the array.

207. (previously presented) A method as claimed in claim 172, wherein the artificial neural network is used for at least one selected from the group consisting of: monitoring and predicting stock price movements, Internet surveillance, Internet security, computer virus detection, computer spam detection, phrases in speech and text, clauses in speech and text, plagiarism detection, bioinformatics, vision recognition, semantic analysis, representation of data ontologies, robotics, and data compression.

208. (previously presented) A computer usable medium comprising a computer program code configured to cause one or more processors and/or memory to execute one or more functions to perform the method claimed in claim 164.

209. (previously presented) A computer usable medium comprising a computer program code configured to cause one or more processors and/or memory to execute one or more functions to perform the method claimed in claim 172.